Blockchain Project Initiation and Execution: Decision-making Practices and Perceptions

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Abstract: Blockchain promises to revolutionise the way data management is perceived by business entities. Nonetheless, we know little of how to decide which data to protect, such that added value exceeds technology introduction and ownership costs. Paper presents our attempt to approach the issue via conducting an international online survey in Kazakhstan, Kyrgyzstan and Russia in late 2018 and early 2019. Paper contributes to the body of knowledge by establishing that up-to-date blockchain introduction is - de facto - an unguided process. Despite multiple efforts to come-up with a decision framework, real-world projects are initiated with little - if any - guidance on potential costs and benefits.

1 INTRODUCTION

Blockchain is expected to redefine "trust in the new generation systems" (Koteska et al., 2017) because it "allows parties to transact with others they do not trust over a computer network in which nobody is trusted" (Mendling et al., 2018). Academic literature already reports its successful application in finance (Judmayer et al., 2017), healthcare (Zhang and Lin, 2018), education (Duan et al., 2017) and other areas.

Nonetheless, we have not been able to identify sources that provide guidance on corporate decision making with respect to blockchain protection such, that merits exceed the costs.

Paper reports an attempt to explore current practices of employing blockchain in business environment and reasoning behind them. Our investigation started by conducting a preliminary set of one-to-one interviews with industry professionals, who have had blockchain project experience. Further, preliminary findings were used as an input to design a questionnaire for an international online survey.

Survey revealed that:

- there is a market-wide Babylonian confusion with respect to the term blockchain between managerial and technical staff,
- only a handful of companies use structured approach to deciding weather to employ blockchain or not, mostly its "hype-driven,"
- choice of the business process to protect is mostly forced "top-down."

Paper contributes to the body of knowledge by establishing that up-to-date blockchain introduction is - de facto - an unguided process. Despite multiple efforts to come-up with a decision framework, real-world projects are initiated with little - if any - guidance on potential costs and benefits.

Remainder of the paper is organised as follows: Section 2 defines research design and includes: research questions, approach and participant demographics. Section 3 sets conceptual foundations and explains survey design. Corresponding findings and relevant discussion is presented in Section 4. Finally, Section 5 concludes the paper and lists its limitations.

2 STUDY DESIGN

Due to its nature, blockchain is expensive in terms of storage and computational complexity, but is also tamper-resistant and irrevocable. Its adoption is a strategic decision that influences company costs structure and its risk exposure. To gain understanding of such decision making we conducted an international online survey, which covered industry professionals

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with prior involvement in blockchain projects from Kazakhstan, Kyrgyzstan and Russia.

The investigation consisted of two stages. First, a pilot enquiry involved a preliminary set of one-to-one interviews with industry professionals, who have had blockchain project experience. The goal here was to identify potential issues, test initial hypotheses and get better understanding of the research domain. Second stage consisted of designing and implementing a questionnaire, designed to conduct a quantitative test of finalised hypotheses.

Throughout the paper we will put forward our initial assumptions, finalised hypotheses and survey findings with relevant discussion and conclusions.

2.1 Research Questions

Decision making is a complex process which involves technical assessment and phenomena of social nature. Through preliminary interview series we got an impression that blockchain functionality was perceived differently by managerial and technical staff. To test this hypothesis we formulated RQ1 as follows:

RQ1: Do technical and managerial employees perceive blockchain functionality differently?

Second, preliminary study developed an impression that the decision to employ was a top-down and hype-driven process. RQ2 and RQ3 respectively seek to investigate if companies on a larger scale had a formal way of making the decision and clearly defined input parameters:

RQ2: What serves as an input to choose business process for blockchain protection?

RQ3: What is the process or an informal sequence of steps to make a decision?

2.2 Study Approach and Participant Demographics

We conducted the online survey between December 2018 and March 2019. It was designed and implemented in two steps. First, we conducted a series of interviews (preliminary study), which provided initial insides into industry perceptions and major drivers. Second, compiled a series of questions and uploaded them to the SurveyMonkey, an online tool with some built-in analytical capabilities.

The study targeted professionals, who have had experience in blockchain projects. Perspective candidate addresses were collected using professional social media (LinkedIn) and groups (Google Groups, Telegram channels), national IT associations and researchers' personal connections. We approached 1200 companies and approximately 3000 professionals (some invitations were sent out by partner IT associations) using e-mail. Tables 1 and 2 present study participants breakdown by their role in the project and the company size.

Table 1: Table presents distribution of study participants by their role in the blockchain project. In the text CEO, CTO and Project managers will be referred to as "managers" and the remaining participants as "developers.".

Role	%
CEO	34%
Team leader	21%
CTO	17%
Project manager	13%
Designer or Architect	2%
Software developer	2%
Other	11%

In the remainder of the paper we differentiate two main categories of interviewees: "managers" and "developers." Managers include "CEO," "CTO" and "project managers," while Developers include "team leaders," "designers," "architect's" and "software developers." Survey questions are identical for both groups; except managers were also asked to provide comments on how organisational issues were discussed and handled.

In Table 1 *Others* constitutes a large proportion of respondents at 11%. It includes researchers, product owners, consultants, and IT professionals who chose not to disclose their position in the project.

Company sizes in Table 2 range from small start-up and spin-offs to large enterprises and public companies. Majority of them is in fin-tech, logistics and software engineering.

Table 2: Table presents distribution of study participants by their company size.

Size	%
Large enterprise (>249)	19%
Medium enterprise (50-249)	19%
Small enterprise (<50)	62%

Table 3: Table presents Survey statistics, including response and completion rates.

	Survey statistics
Invitations sent	3000
Response rate	6.2%
Completion rate	10.16%

Survey forms were filled out by 186 professionals from 142 companies (see Table 3). In 45 cases respondents did not indicate their company name,

44 respondents solemnly represented their companies. Other companies were represented by 2 or more members of staff.

3 THE BACKGROUND

3.1 Conceptual Foundations

Innovation diffusion takes place on three main levels (Schiavone, 2010): market (macro level), in the social system where potential adopters are located (meso level) and individual company (micro) level.

Innovation adoption models (Rogers, 2003), (Parasuraman and Colby, 2001) are key to conceptualise technology life-cycle on the macro level. They define the social processes - called "diffusion" - by which ecosystem participants communicate and adopt innovations over time. They map diffusion stages to corresponding adopter (innovation user) profile and characteristics. Evolutionary theories (Nelson and Winter, 1985) then provide innovation with a path-dependent process (Dosi, 1982) where they are developed through interactions between various actors and then tested on the market.

On meso and micro level there are several decision-making models. In (Koens and Poll, 2018) authors present a comprehensive survey concerning blockchain related decision making tools and arrive to following conclusion:

1. most tools seek to answer three questions: "Should you use a blockchain? If so, which blockchain variant is best? If not, which alternative is best?",
2. there are inconsistencies between the schemes, where the same decision lead to different outcomes, or, conversely, similar outcomes can be reached with opposing decisions,
3. non-blockchain solutions are often a better choice as they lack some of the downsides and limitations of blockchain.

Since the goal of current investigation is to shade the light on practical aspects of software project initiation we extracted key decision making pivot points from schemes, presented in (Birch et al., 2016), (Koens and Poll, 2018) and (Wüst and Gervais, 2017). As a result, we implemented a set of questions that seek to explore if real-world decisions were guided by similar concerns.

3.2 Questionnaire Design

Survey contains three blocks of questions. First block contains questions, formulated to evaluate respondent category (manager/technical expert), position (CEO, Software engineer, etc.) and employer organisation, as well as dummy warm-up questions to set respondent mind on topic:

- Looking back, can you estimate (approximate time) how much time it took for the project team to gain common understanding of the scope of the project?
- Did the Project involve smart contract or token exchange?

The second block starts with the "Babylonian confusion question", which asks respondents to choose blockchain properties from the following list:

1. protects data from theft
2. protects data from being corrupted or replaced
3. protects user identity
4. does not permit updating blocks of data

If the respondent chooses options 2 and 4 we will put the answer down as "right," options 1 and/or 3 as "wrong." Any other combinations will be "partial."

Further, we introduce questions that target decision making procedures using a mix of open- and close-ended questions, targeted towards identifying decision support tools and procedures, stakeholder influence. In particular, we were interested if companies are using formal frameworks:

- To the best of your knowledge, list stakeholders who had the most influence to the decision when adopting the blockchain.
- To the best of your knowledge, which of these were used when deciding to employ the blockchain. Please, select items from the following list:
- Please, list frameworks, decision tree diagrams or other tools that were adapted and used throughout the process of initiating and planning the blockchain project.

Survey participants were also allocated separate space to list any additional information they would think appropriate.

Third block was designed to explore if organisations followed certain logic, i.e. developed an informal guideline.

4 FINDINGS AND DISCUSSION

4.1 Blockchain Maturity Implication

Survey (Table 4) confirmed existence of the perception mismatch between managers and technical specialists.

Table 4: Table presents responses to the Babylonian confusion question. Managers demonstrate clear misconception of the blockchain functionality, whilst technical staff would provide partially correct answer in of 4% of cases.

	Right	**Partial**	**Wrong**
Technical staff	96%	3.7%	0.3%
Managerial staff	71.2%	28%	0.8%

We believe the mismatch is a result of the blockchain position in the diffusion life-cycle. In particular, it is in the late *early adopters* or beginning of the *early majority* stage (1). Innovator stage has passed because there are well-known adoption use-cases, out-of-the-box and outsourcing solutions. Early adopters are acting as leaders of the social system, while Early majority are guided by available experiences. Late majority, by definition, acquires new technology when pressured by the competition. Since this is clearly not the case, the stage has not been reached yet.

Figure 1: Innovation Adoption Curve (Rogers, 2003). It illustrates innovation diffusion as a sequence of stages and provides adopter profiles. Early adopters of the blockchain are acting as leaders of the social system, while Early majority are guided by available experiences. Late majority, by definition, acquires new technology when pressured by the competition. Since this is clearly not the case, the stage has not been reached yet.

Such an early stage results in developers being down to "ground work" and having to face technology particularities and implementation details. On contrary, managers operate using higher level abstractions, being influenced by marketing, oversimplification and occasional misinterpretation of concepts. The mismatch will naturally disappear as a result of progression as defined by evolutionary theories.

4.2 The Decision Process

Blockchain related decision making tools utilise following key pivot points:

- Access Control Requirement. That is if the system should enable data access permissions or allow everyone to access it without restrictions.
- Shared Write Access Requirement. Do all parties that add and alter data share trust and pursue the same goal?
- Control Requirement. Is there a party that needs to control the system?
- Data Volume and Access Frequency Requirement. How often data is added, altered and accessed?

Survey results indicate that access control requirement was considered at the project initiation stage in 87% cases, in 10% cases had to be considered at a later stage of the project and in 3% had not been an issue at all.

Shared write access requirement, on the other hand, had been considered in 100% of cases at an initiation stage of the project, while control requirement is indicated to become an issue in only 13.7% of cases.

Survey results also indicate that data volume and access frequency was a tricky factor to determine. Being only considered as a parameter in 31.3% of cases, it was mostly determined by the "rule of thumb" (Table 5).

Table 5: Table presents feedback on considering data volume (V) and access frequency (F) requirement at the decision making stage.

	Positive response
F or V	28.6%
Both	2.7%
None	68.7%

Overall it was noted that none of the respondents indicated having a structured decision making process that would have a clear guidance on decision paths. In pilot studies two interviewees outlined the need to consider several factors (such as financial and non-material benefits) that were not found in decision making schemes, available online. In other words, despite searching for a structured decision making framework, market players did not get one, which would satisfy stakeholder needs.

5 CONCLUSIONS

Paper presents the result of an exploratory study to evaluate blockchain related corporate decision making. Having conducted a two-step enquiry we discovered that:

- there is a market-wide Babylonian confusion with respect to the term blockchain between managerial and technical staff, which is explained by its early-stage in the technology diffusion cycle;
- current decision making is mainly top-down and hype-driven. Technology application scenarios lack strong business use-cases and tools. Very few companies employ structured decision making schema, leading to inconsistency, when similar reasoning leads to different outcomes across reviewed companies.

In other words, we see that industry is at the early stage of developing value perception and application practices for the blockchain. Unfortunately, this is happening - as it seems - with little integration between academic and industrial communities.

The study has several following limitations:

1. we realise that despite covering wide selection of company types and major job roles, the survey could reach better representative balance across organisations and domains, if selection was targeted by technology application scenario, for instance;
2. data might be self-reported and indeed self-selected. For example, it is possible that respondents might be more likely to self-select, if they were interested in or even sponsors of the blockchain introduction in their company;
3. we realise that presented results may exhibit arguable causality. The way to approach this issue would be to design and conduct a multi-criterion analysis with data from several independent sources. Nonetheless, we do not see such an option possible at the moment due to unavailability of statistically significant amount of such data.

Further research will investigate aspects of decision making that are not currently covered by available decision making schemes. The findings will serve as an input for the novel model and its application tools.

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